REMARKS

By Final Office Action mailed July 13, 2007 ("the outstanding Office Action"), prosecution of this application was closed. Accordingly, Applicants have filed herewith a Request for Continued Examination (RCE) to continue prosecution of the pending subject matter, to which this Amendment constitutes the "submission" pursuant to Rule 114.

Restriction Requirement

Claims 1-15 (*i.e.,* the Group I claims) have previously been elected, without traverse, for continued prosecution in this application, and are currently pending. Claims 16-21 (*i.e.,* the Group II claims) have been previously canceled without prejudice to further prosecution of the same in a divisional application.

Election of Species

Applicants have previously elected species I-4 for purpose of initial examination (*i.e.,* claims 10-15). If the elected species is found patentable, the search and examination will be extended to the withdrawn species of claims 1-9. Accordingly, claims 1-9 are subject to a provisional Restriction Requirement, which will be withdrawn upon allowance of a generic claim. If it was the Examiner's intent to enter a Restriction Requirement between the subject matter of claims 1-9 and claims 10-15 (as opposed to a provisional Restriction Requirement), Applicants request entry of the same on the record, thus permitting continued prosecution of the subject matter of claims 1-9 in a divisional application (which subject matter has yet to be examined).

Rejections Based on 35 U.S.C. §102(b) and/or §103(a)

Claims 10-15 stand rejected under 35 U.S.C. §102(b) as anticipated by and/or under §103(a) as obvious over the following five references taken individually or on various combinations: (1) U.S. Patent No. 4,131,721 to Fung et al. ("Fung"), (2) U.S. Patent No. 5,277,996 to Marchetti et al. ("Marchetti"), (3) U.S. Patent No. 4,810,594 to

Bregoli et al. ("Bregoli"), (4) U.S. Patent No. 5,096,560 to Takai et al. ("Takai"), and (5) U.S. Patent No. 5,681,435 to Joshi et al. ("Joshi"), for the reasons set forth in the outstanding Office Action at pages 1 through 7. These rejections, along with Applicants' prior arguments in favor of patentability, are not repeated herein for purpose of brevity (these remarks are, however, incorporated herein by reference in their entirety).

Instead, the basis of the Examiner's rejection of the pending claims is summarized, under the heading "*Response to Arguments*", in the outstanding Office Action beginning at the bottom of page 7 and ending at the bottom of page 8. The following comments are directed to those specific issues.

Examiner's Response to Arguments

The Examiner continues to reject the pending claims based on the teachings of Fung and Marchetti. In particular, the Examiner states at page 8 of the outstanding Office Action that:

> *Applicant' principal arguments are*
> *(a) The graphitized carbon in Fung reference is serving as the anode, but not as the support;*
> *(b) Marchetti reference does not disclose the use of graphitized carbon as the anode support as recited in claim 10.*

For purpose of clarity, Applicants will address the teaching of each of these references, as well as Applicants' characterization of the same, separately below.

The Fung Reference

The Examiner has correctly characterized Applicants' arguments directed to the teaching of Fung (provided the Examiner's reference to "support" is understood to be the catalyst support). In other words, it is Applicants' position that Fung does not disclose the use of graphitic carbon as the catalyst support. Instead, Fung teaches an electrocatalyst that uses carbon particles as the support for the platinum catalyst. [1] The

[1] Fung discloses a fuel cell wherein "suitable support particles ... are finely divided carbon" (col. 3, lines 3-4), which "carbon is activated ... with a phosphorous-oxygen-containing compound" (col. 3, lines 5-7). As explained at col. 3, lines 9-13, stability was obtained with activated carbon having a certain surface area

only mention of graphitic carbon (referred to in Fung as "graphitized carbon") has to do with mixing the electrocatalyst (*i.e.,* platinum catalyst supported on carbon particles) with graphitized carbon and a binder prior to being pressed onto a gold screen to form an electrode (*see* Fung at col. 4, lines 23-26). Thus, the graphitized carbon is serving as the anode in this context, and in no instance does Fung disclose an anode utilizing graphitic carbon as the catalyst support.

The Examiner has dismissed Applicants' argument, stating (at page 8 of the outstanding Office Action) that:

> In the instant specification, the carbon supported Pt/Ru catalyst composition is prepared by mixing the catalyst with the carbonaceous material. See page 39. Fung reference teaches the graphitized carbon is mixed with the electrocatalyst and binder to form the anode electrode. In essence, the electrocatalyst is supported on the graphitic carbon material, which is part of the anode structure.

Applicants respectfully submit that the alleged similarities between the claimed subject matter and the teaching of Fung are misplaced. As noted above, Fung teaches an electrocatalyst that uses carbon particles (not graphitic carbon) as the support for the platinum catalyst. As the Examiner is aware, catalyst supports (typically carbon-based powders) have been used in the fuel cell industry in order to provide a very high catalyst surface to volume ratio, and thus reduce the amount (and cost) of the catalyst required (*see* specification at page 3, lines 14-18). Fung discloses an electrocatalyst that employees a traditional catalyst support; namely, platinum supported on carbon particles. The electrocatalyst of Fung is mixed with graphitized carbon and a binder, followed by pressing onto a gold screen to form an electrode (col. 4, lines 23-26). In this context, the

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and a certain phosphorous level "based on the weight of the carbon support". At col. 3, lines 13-15, Fung identifies the physical properties and the phosphorus level of a variety "of such activated carbon supports" treated with phosphoric acid. Further, Fung teaches formation of platinum crystallites on the surface of the "activated carbon support particles" (col. 3, lines 40-43), followed by the activation of the same (col. 3, lines 59-60). Preferred deposition levels of the platinum range from about 5% to about 25% (or more) "based on the weight of the carbon support particles" (col. 4, lines 12-15). Thus, as evidenced by the above quotes, Fung teaches an electrocatalyst that uses carbon particles as the support for the platinum catalyst. In no instance does Fung teach or suggest the use of graphitic carbon as the catalyst support.

graphitized carbon is clearly serving as the anode, and is not serving as the catalyst support as this term is used in the context of this application.

The Examiner, however, states that "[i]n essence, the electrocatalyst is supported on the graphitic carbon material, which is part of the anode structure" (*see* the outstanding Office Action at page 8). In order to clarify that the graphitic carbon serves as the catalyst support (as opposed to the anode), Applicants have amended claim 10 to recite that the "supported catalyst comprises a catalyst supported on graphitic carbon".[2] In this way, claim 10 more clearly recites the nature of the "support" – that is, the graphitized carbon serves as the catalyst support, and not simply as general support in the context of the anode.

Thus, and contrary to the Examiner's position, Fung cannot fairly be read to disclose the subject matter of claim 10 as amended herein. Instead, Fung teaches an electrocatalyst that uses carbon particles as the support for the platinum catalyst, then mixes the same with graphitized carbon and a binder, and presses the resulting mixture onto a gold screen to form an anode electrode. Such teaching does not teach or suggest the use of graphitic carbon as the catalyst support, at least as this term is used in the context of the claimed subject matter. The fact that graphitic carbon is used in the formation of the anode of Fung does not change this conclusion. Regardless of the form of carbon used to make the anode, Fung only discloses the use of carbon particles as the catalyst support, and in no way teaches or suggests a supported catalyst comprising a catalyst supported on graphitic carbon as recited in claim 10.

The Marchetti Reference

As noted above, the Examiner has summarized Applicants' arguments directed to Marchetti as not disclosing "the use of graphitized carbon as the anode support as recited in claim 10." Applicants' position, however, is that Marchetti does not teach or suggest the use of graphitized carbon as the catalyst support.

[2] Support for this amendment may be found throughout the specification as originally filed, including at page 23, lines 9-16.

Instead, Marchetti discloses electrodes that utilize graphitized carbon as a porous carbon substrate layer (col. 3, lines 11-12). An anchor layer (C_{60} fullerene) is provided on the porous carbon layer (col. 3, lines 13-15), to which a platinum layer is attached (col. 3, lines 16-18). Thus, the C_{60} fullerene "anchor layer" (which sits on top of the graphitized carbon substrate layer) serves as the platinum support layer, not the underlying graphitized carbon substrate layer. Thus, Marchetti does not teach or suggest the use of graphitized carbon as the catalyst support.

The Examiner has dismissed Applicants' argument, stating (at page 8 of the outstanding Office Action) that the:

> Marchetti reference reaches the electrode is composed of substantially planer adjacent layers. These layers include a carbon substrate layer such as graphitized carbon, an anchor layer composed of C_{60} and platinum layer serving as the catalyst. The platinum catalyst is supported on the graphitized carbon layer. The recitation "comprises" in claim 10 is open language that could encompass additional layer in the anode structure.

As discussed in the prior section, Applicants have amended claim 10 to recite that the "supported catalyst comprises a catalyst supported on graphitic carbon." The phrase "supported on" necessarily requires that the catalyst be both "supported" (*i.e.,* attached to) and "on" (*i.e.,* in contact with) the graphitic carbon. In no instance does Marchetti teach this aspect of the claim invention. Instead, Marchetti teaches a catalyst supported on a C_{60} fullerene layer. While this fullerene-catalyst supported layer sits on top of a graphitic carbon layer, the catalyst is not "supported on" the graphitic carbon as this phrase is used in the context of the claim 10.

Conclusion

For the reasons set forth above, Applicants respectfully submit that neither Fung nor Marchetti teach or suggest all the recited elements of claim 10, particularly the requirement that the supported catalyst comprises a catalyst supported on graphitic carbon. Accordingly, Applicants request that the rejections of claim 10, which rejections rely on Fung or Marchetti individually or in combination, be withdrawn. Further, since claims 11-15 depend from claim 10, and thus contain all the limitations thereof,

Applicants submit that these claims are patentable for the same reasons as noted above in the context of claim 10.

Lastly, and assuming the Examiner finds claims 10-15 allowable, Applicants request rejoinder and examination of claim 1-9. Alternatively, and as mentioned above, if it was the Examiner's intent to enter a Restriction Requirement between the subject matter of claims 1-9 and 10-15 (as opposed to a provisional Restriction Requirement), Applicants request clarification and entry of the same. If such a Restriction Requirement is made of record, Applicants will cancel claims 1-9 and pursue this subject matter in a corresponding divisional application (which subject matter has yet to be examined).

A good faith effort has been made to place this application in condition for allowance. However, should any further issue require attention prior to allowance, the Examiner is requested to contact the undersigned at (206) 622-4900 to resolve the same.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,

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